

WASHINGTON

SCIENCE TRENDS

HIGHLIGHTS

- * NASA-Army Space Plans
- * Air-Space Frequencies
- * Project Plowshare
- * Research Checklist
- * Publication Checklist

Vol. III No. 6

October 26, 1959

NASA Assumes Army Space Program

National Aeronautics and Space Administration has reluctantly accepted Administration orders to accept the Army's space "team" as the main technical nucleus of future development of large "boosters" for manned space exploration. The decision will precipitate another lengthy reappraisal of the national space effort.

- * Army's Future Role: The decision, which will eventually be accepted by Congress, will leave the Army with a good deal more "elbow room" in plans and expenditures for tactical missiles for use by its field forces. Von Braun and his associates will still be available for technical consultation but the emphasis in the next few years will be on further refinement, test and evaluation of missiles already in an advanced stage of development.
- * Air Force Implications: From a long-range point of view the shift severely damages the Air Force's plans to become the major factor in manned military space ventures. The Air Force is now plainly blocked in its ambitions to control the super-boosters that will make such missions possible in the next decade. Should such vehicles be required for defense purposes they will have to be acquired in hat-in-hand fashion from the civilian space agency.
- * Super-Booster Plans: Under White House orders the Von Braun group will now have the largest single voice in the development of large-thrust engines. It is expected that this group will naturally favor the cluster of eight Rocketdyne Jupiter engines into the large "Saturn" booster, which has previously been financed by the Advanced Research Projects Agency.

Now out of the picture are Air Force proposals for use of a so-called Super Titan, a combination of four Titan ICBM engines.

The outlook is now less promising for accelerated development of the so-called NOVA super-booster, now in the concept-study stage, which NASA has been supporting while professing lack of interest in the Saturn. NASA officials must now begin the lengthy and in some ways distasteful project of familiarization with the "rival" Saturn. They already claim to have no knowledge of previous plans to use a Titan second stage for this program.

Air-Space Frequencies

Federal Communications Commission will receive comments up to Nov. 30 on its proposal to reallocate radio frequencies for air traffic control and earth/space and space communications. Plans call for the shift to take place next July 1.

Five additional megacycles would be made available for air traffic control within the frequency range of existing equipment. The 132-135 mc band would be removed from the present Government band for use by Governmental and non-governmental aircraft stations. The frequencies could also be used by Government fixed, mobile and radio positioning services on a "no interference" basis. The 135-136 mc band would be allocated for earth-space and space services as a joint Government/non-Government band. In addition, use of this band for Government fixed and mobile services, and its continued use by Government radio positioning service, would be permitted on the same "non-interference" basis.

In addition, about 712 aeronautical enroute stations would have to be shifted so that an additional two megacycles of spectrum band (126.825 to 128.825) could be used in air traffic control communications by Government and non-Government aeronautical and aircraft stations.

Industrial Radioisotopes

Atomic Energy Commission will join with local organizations to sponsor a conference on the Industrial Uses of Radioisotopes at Detroit, Dec. 1 and 2, 1959. As is usual in these conferences, Government and industrial speakers will describe programs and experiences of interest to industry and education.

(For further information write Mr. Harry Richart, Greater Detroit Chamber of Commerce, 320 West Lafayette Street, Detroit 26, Mich.)

Antarctic Research Grants

National Science Foundation is making an additional \$651,770 in research grants for Antarctic studies in various fields of science. One study, to be conducted by the U.S. Bureau of Mines, will endeavor to discern methods and conditions of mineral exploration in isolated areas.

(Complete list of grants available from Press Office, National Science Foundation, Washington 25, D.C. Ask for NSF-59-160)

For Sale: Ordnance Works

General Services Administration has retained an industrial brokerage firm, the Harry A. Taylor Co., East Orange, N.J. in a new attempt to sell the huge Morgantown Ordnance Works, Morgantown, W.Va. The property may be sold in its entirety or in two parts -- the chemical units and the oven area which has a potential production capacity of 400,000 tons of coke annually.

Dosimeters

Office of Civil and Defense Mobilization is plugging the action of Bendix Aviation Corp. in reducing retail prices of its basic dosimeters from \$15 to \$7 postpaid. Note is also made of the fact that Victoreen Instrument Co., Cleveland, will soon offer instruments in the same price range. OCDM would like to have other interested producers obtain copies of specifications now available for fall-out measurement devices. (For details, write OCDM, Battle Creek, Mich.)

Project Plowshare - Oil Storage

A study by the Sandia Corporation, now made public, concludes that there are no engineering or technical obstacles to preclude the use of nuclear explosions in the creation of underground oil storage tanks.

Cost: Significant savings are said to be possible, particularly if nuclear devices of ten kilotons or more are to be used.

One estimate indicates that the cost of constructing an underground storage tank having a volume of 7×10^7 barrels would be on the order of 279 million dollars if a one megaton device is used. Even if the size of the potential excavation is reduced by a factor of ten a savings of 27 million dollars is said to be feasible.

Radiation: The Sandia study suggests that radioactive particles from the nuclear device could possibly be covered with a layer of concrete, if the cavity were to be accessible. Another possibility is the "flushing" of the cavity with water before it is initially used. It is said that shooting water into the cavity under high pressure would create high turbulence - making possible the removal of a high percentage of the particles that would be ordinarily suspended in the stored oil. Other suggestions include the filtering of contaminated particles immediately upon removal from storage, or decontamination at the refinery.

Prospects: The progress of the entire "Plowshare" program for the peaceful use of nuclear detonation now hinges on international negotiations and agreements on suspension of nuclear testing. There appears to be little likelihood of actual field experimentation in the near future.

(Report now available. 24 pages. 75 cents. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for Sandia Corporation Technical Memorandum 233-58(51))

Food Irradiation Setback

Plans for construction of a \$7.5 million U.S. Army Food Ionizing Radiation Center at Stockton, Calif., are being "deferred" pending further technical and economic studies. About \$1.3 million has already been spent on the project.

Army has hoped to by-pass the problem of long-term food storage through sterilization by high-dose radiation. However, unexpected and in some cases unexplained, results with laboratory animals have given rise to reports, confirmed this week, that the program might be deferred.

Curtiss-Wright Corporation has been at work under a \$1.6 million contract for a cobalt -60 gamma radiation source known as the High Intensity Food Irradiator, while Varian Associates, Palo Alto, Calif., has had a \$1 million contract for a linear electron accelerator. Plans had called for study of both methods of irradiation. Foods irradiated at other facilities were used in the original test program which led to the "deferment."

Research Checklist

- () "Deck Flexure" Research: Navy Bureau of Ships is working on development of instruments with which to measure so-called "deck flexure" - the twisting, bending, contraction and expansion of ship sections due to the influences of sea, wind and temperature. The studies have become necessary because of the critical alignment problems of modern missile, fire control, electronic and navigational equipment. New devices are needed to measure the extent of error caused by deck flexure in equipment already on shipboard, and the error that may be expected in equipment under development.

- () Metal Embrittlement Research: Studies at the AEC-Argonne National Laboratory indicate that hydrogen bonds are not formed equally in all directions within the structure of a metal - thereby causing embrittlement and failure under stress. The theory, stemming from neutron diffraction studies, may bring a re-evaluation of theories which hold that mechanical defects such as pores, micro-cracks, fissures, intergranular holes and such, play the major role in embrittlement.

(R&D by Neutron Diffraction Group, Dr. Surain S. Sidhu, Director, Argonne National Laboratory, Lemont, Ill.)

- () Electrolytic Saw: Government-Sponsored studies at the University of Illinois indicate that much higher rates of strain-free cutting of metal crystals in the laboratory can be achieved through the use of an electrolytic "saw" rather than by conventional chemical methods. Construction of the suggested apparatus is described in detail.

(Report available. 8 pages. 50 cents. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 574)

- () Inorganic Polymers: The Navy has begun a study of inorganic compounds of a polymeric nature which might serve as lubricants and thermal or electric insulators for application under conditions of extreme temperature, shock and abrasion. It is intended to study both traditional and novel methods for the production of inorganic polymer skeletons which can be modified by the addition of side chains into products with promising military value.

(R&S by Chemistry Division, U.S. Naval Research Laboratory, Washington 25, D.C.)

- () X-Ray Absorption Measurements: Studies by the General Electric Co. for the Atomic Energy Commission have resulted in a new standardization technique for the determination of uranium in solution. Previously, uranium solutions were used as standards and daily calibration of the x-ray photometer was required. It was found that by using machined aluminum plates as standards accurate results could be obtained with an important saving in time.

(R&D by Applied Materials Research Sub-section, Aircraft Nuclear Propulsion Department, General Electric Co., Cincinnati 15, Ohio)

- () Improved Digital Circuitry: Modification of a previously-designed magnetic core amplifier circuit is said to have contributed improved stability, increased logical gain and a faster complementer. The development stems from National Bureau of Standards studies of saturable core reactors as replacements for vacuum tubes and transistors in signal regeneration.

New modification adds a transistor emitter follower to the original circuit. Although this does not change basic operation it is said to improve the volt-second transfer function, and to provide additional current gain.

(Circuit details available. Free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Report - Improved Magnetic Core Digital Circuitry)

- () Electromagnetic Rock Fracture: Studies sponsored by the Atomic Energy Commission are designed to determine what causes certain rocks to fracture or "disintegrate" when exposed to electromagnetic fields. Although this process has been demonstrated in the past it is believed there has been no serious effort made to determine the mechanism involved, or to evaluate the potential of this process in mining and related fields.

(R&D by Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.)

- () Rocket Engine Cooling: National Aeronautics and Space Administration has studied the effects of rocket-engine design parameters on regenerative cooling capabilities of hydrogen-fluorine, hydrogen-oxygen, hydrazine-fluorine, ammonia-fluorine, and JP4 jet engine fuel and oxygen. Analysis indicates that combinations using hydrogen as the fuel and coolant display the best cooling possibilities. Significant increases in cooling capabilities accompany the use of ceramic linings in the rocket chamber and nozzle.

(Report available. Single copies free. Write NASA, Code BID, 1520 H Street, N.W., Washington 25, D.C. for NASA TN - D 66)

- () Ground Effect Vehicles: Mathematical formulas for calculation of cruising performance, stability and control of annular-jet ground cushion vehicles have been devised by the Navy. Preliminary studies show that while a circular plan form affords the most efficient hovering capabilities an elongated form may give better overall performance for forward flight. It is also believed that compartmentation of the base of the vehicle is the most promising means of achieving stability.

Study also indicates that compartmentation provides an effective means of attitude control, since the pressure lift of a single compartment can be controlled by controlling the momentum of the section of main annular jet adjacent to that compartment.

(R&D by Aerodynamics Laboratory, David Taylor Model Basin, Washington 7, D.C.)

Publication Checklist

- () Cermets, a new catalog listing all unclassified Government-sponsored research reports in this field. Single copies free. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for CTR -319 Cermets, 1940-1959)
- () Federal-State Relationships, the complete transcript of hearings on the question of federal and state responsibilities in the field of atomic energy. 504 pages. Single copies free. (Write Joint Committee on Atomic Energy, F-88, The Capitol, Washington 25, D.C. for Hearings, Federal-State Relationships)
- () Natural Gasoline and Cycling Plants, a survey of the production capacity of these facilities in the U.S. as of Jan. 1, 1958, including information on types of plants and daily output. 12 pages. 15 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Bureau of Mines Inf. Circ. 7866)
- () Grants and Awards, a detailed accounting of 5,262 training grants, research fellowships and traineeships issued by the Public Health Service-National Institutes of Health. 119 pages. Single copies free. (Write Information Office, Division of Research Grants, NIH, Bethesda 14, Md. for Grants and Awards - Part II)
- () Radioactive Waste Disposal, a study of rock salt deposits in the U.S. as possible disposal sites for radioactive wastes. 174 pages. (Available for inspection only at U.S. Geological Survey Offices, New Custom House, Denver, Colo; Thomas Bldg., Dallas, Tex; Federal Bldg., Salt Lake City, Utah; Appraisers Bldg., San Francisco, Calif., and Bartlett Bldg., Los Angeles, Calif.)
- () Exchange Programs, a complete State Department survey of all exchange of person programs, including scientific and industrial, between the U.S. and the Soviet Bloc. 57 pages. Single copies free. (Write Committee on Foreign Relations, U.S. Senate, Washington 25, D.C. for Committee Print, U.S. Exchange Programs)
- () Structural Joints, a study by the National Bureau of Standards of the creep behavior of structural joints under cyclic loads and temperatures. 37 pages. Single copies free. (Write NASA, Code BID, 1520 H Street, N.W., Washington 25, D.C. for NASA TN D-181)
- () Small Nuclear Power Plants, a survey by an AEC Task Force of the capabilities and status of the boiling water, pressurized water, and organic moderated reactor concepts as related to small-sized civilian nuclear power stations. 59 pages. \$1.75. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for TID 8508)
- () Meteor Trains, one of a series of reports by the Smithsonian Institute. This section presents data on the heights, durations and intensities of 48 meteor trains. 15 pages. 20 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Pub. No. SI 1.12/2:3/8)

